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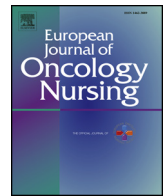
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# Attitudes towards physical activity and exercise in older patients with advanced cancer during oncological treatment – A qualitative interview study

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## ABSTRACT

**Purpose:** Older patients with cancer are underrepresented in exercise-based trials. To engage older patients in physical activity (PA), it is necessary to consider age-related decline in health, comorbidities and practicalities. The study aim was to explore attitudes towards PA and exercise among older patients with cancer to inform future exercise-based interventions.

**Method:** Individual interviews (N = 23) were conducted in patients ≥ 65 years with advanced lung, biliary tract and pancreatic cancer receiving palliative oncological treatment. Patients were recruited with a purposive sampling strategy. A semi-structured interview guide focusing on attitudes towards PA and exercise, including barriers, facilitators and motivators, was used. Data on the informants' medical history, demographics and PA level was collected.

**Results:** Identified themes were: 1) a general positive perception of physical activity is expressed 2) comorbidities and external circumstances prevent physical activity, 3) fatigue overshadows life, 4) social support is key to short and long-term motivation, 5) fixed conditions keep one focused, 6) familiarity raises confidence and motivation.

**Conclusions:** Even though perceptions of PA were positive among older patients with cancer, most struggled to stay physically active during oncological treatment. Several factors related to cancer and aging were identified as barriers; most profoundly was the overwhelming feeling of fatigue. Improving physical and mental well-being, fixed conditions (e.g. group-based exercise and supervision) and social support were identified as motivators and facilitators. Preferences for PA varied, but activities that were familiar increased motivation. Exercise programs for older patients with cancer must be adjustable to each patient's limitations, needs and personal resources.

## 1. Introduction

Normal aging is associated with declines in physical capacity and function (Hawkins and Wiswell, 2003). A diagnosis of cancer and related treatments can accelerate decline in health and increase the risk of disabilities (Grov et al., 2011). Among older patients with cancer, psychological distress has been shown to be associated with poor physical function and loss of independence (Hurria et al., 2009). Exercise has the potential to improve health, physical functioning and

well-being in patients with cancer. Documented effects include reduction of symptoms and side effects, and improvements in physical capacity, mobility and quality of life (QoL) (Buffart et al., 2017; Gerritsen and Vincent, 2016). Even though older people account for the greatest proportion of most cancer populations, older patients with cancer have been underrepresented in clinical trials, due to studies' eligibility criteria on comorbid conditions and functional status, health care professionals' (HCPs) perceptions and concerns about treatment toxicity, and the need for additional resources in the inclusion process (Hurria,

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**Table 1**  
Interview guide.

Research areas	Interview questions
PA status (introduction)	<ul style="list-style-type: none"> <li>● Tell me about your current level of PA.</li> <li>● What type of PA/exercise do you engage in?</li> </ul>
Attitudes towards PA and exercise during oncological treatment	<ul style="list-style-type: none"> <li>● What does PA mean to you?</li> <li>● What does it mean to you and for your daily life to be physically active?</li> <li>● What does it mean to you and for your daily life to be physically inactive?</li> <li>● What are your thoughts about being physically active and exercising during treatment with chemotherapy/immunotherapy?</li> </ul>
Barriers towards PA	<ul style="list-style-type: none"> <li>● Has the cancer diagnosis and/or oncological treatment affected your daily level of PA?</li> <li>● What (if anything) makes it difficult for you to stay physically active and/or to exercise in your current situation?</li> </ul>
Motivators, facilitators and preferences for PA	<ul style="list-style-type: none"> <li>● What motivates you to stay physically active/to exercise?</li> <li>● What could motivate you to become more physically active/start exercising?</li> <li>● What could help you to stay motivated for PA/exercise?</li> <li>● What kind of PA/exercise would you prefer?</li> <li>● Would you prefer to engage in PA/exercise alone or in groups (if any preferences)?</li> <li>● Who would you prefer to engage in PA/exercise with (if any preferences)?</li> <li>● If you were to imagine engaging in PA and/or participating in an exercise program in your current situation, how should the program be composed and organized?</li> </ul>

Abbreviation: PA (physical activity).

2007; Townsley et al., 2005). Older patients with cancer are also underrepresented in exercise-based intervention studies (Kilari et al., 2016). Especially, there is a serious lack of evidence regarding the feasibility and effect of exercise-based interventions in older patients with advanced cancer (Kilari et al., 2016).

Patients tend to decrease their level of physical activity (PA) after a cancer diagnosis (Fassier et al., 2016). In a systematic review comprising 15 studies, Ormel et al. (2018) investigated predictors of exercise adherence during and after cancer treatment, and found that close location of training facilities, extensive exercise history, high motivation, and fewer physical limitations were the most prominent predictors of adherence (Ormel et al., 2018). Due to challenges with maintenance of PA among patients with cancer, it is essential to explore the patients' perceptions of PA and to use this information to develop feasible exercise programs. Prior studies focusing on patients with cancer during treatment have identified factors such as symptoms and side effects, physical limitations, comorbidities, psychological problems (i.e. distress, depression and anxiety), and environmental factors (e.g. bad weather and lack of transportation) as barriers to exercise (Blaney et al., 2010; Fisher et al., 2016; Granger et al., 2017; Mas et al., 2015). In contrast, support from friends and family and tailored programs have been identified as facilitating factors (Blaney et al., 2010; Fisher et al., 2016; Granger et al., 2017; Mas et al., 2015). However, only one qualitative study has investigated the perceptions of exercise in older patients with cancer. In this study, Whitehead et al. (Whitehead and Lavelle, 2009) explored PA patterns and attitudes towards exercise among 29 female breast cancer survivors  $\geq 59$  years (range 59–86, mean 67) through individual or focus group interviews and found that the levels of PA declined during treatment and did not return to pre-diagnosis level. Cancer-related symptoms and side effects, comorbidities, lack of motivation, and fear of harmful effects were identified among several barriers to exercise. Perceived motivators included health benefits, controlling medical conditions, returning to normal life, better self-image and weight loss. All participants in the study were one to five years post-diagnosis and received hormone therapy (Whitehead and Lavelle, 2009). Hence, there is a lack of knowledge regarding the perceptions of PA among older patients with advanced cancer during oncological treatment. To fill in this gap in the literature and to develop future intervention studies, the aim of this study was to explore attitudes towards and experiences with PA and exercise among older patients with advanced cancer during palliative oncological treatment.

## 2. Methods

### 2.1. Study design

To gain an in-depth understanding of older cancer patients' experiences and attitudes towards PA, the study adopted a qualitative approach using semi-structured interviews. In addition, quantitative data regarding the informants' demographics, medical history and PA level will be collected to increase transferability of the study.

### 2.2. Participants and procedures

Eligible participants were patients  $\geq 65$  years with advanced pancreatic, biliary tract or non-small cell lung cancer (NSCLC) who currently received first-line palliative chemotherapy or immunotherapy at the outpatient clinic at the Department of Oncology, Herlev and Gentofte Hospital, Denmark, from November 2017 to March 2018. The decision to include patients with biliary tract, pancreatic and NSCLC was based on the fact that these cancers are most often diagnosed among older people (median age at diagnosis 67–72 years), and because the majority of these patients already have advanced disease at the time of diagnosis (Ansari et al., 2016; Valle et al., 2010; Walters et al., 2013). The only exclusion criterion was if patients were unable to provide an informed consent due to cognitive or linguistic challenges. A purposeful sampling strategy was used to ensure variation in diagnosis, gender and age. Eligible patients were approached and informed about the study by the primary investigator Marta Kramer Mikkelsen (MKM).

### 2.3. Data collection

A semi-structured interview guide that focused on two different research topics was developed. The selected research topics were (a) experiences and coping with cancer, treatment-related symptoms and side effects, and (b) experiences with and attitudes towards PA and exercise during cancer treatment. This current article solely covers the results from research topic b. The guide included an introductory question about the patients' current PA level, and then comprised questions related to three research areas; (I) attitudes towards PA, (II) barriers towards PA, and (III) motivators, facilitators and preferences for PA (Table 1). Interviews were conducted by MKM at the hospital, by telephone or in the informant's home according to the informant's preference. If an informant preferred that a relative was present during the interview, this was accepted. All interviews were digitally recorded and transcribed verbatim. Patient-reported data on socioeconomics were collected through a questionnaire. Current leisure time PA was

assessed with a modified version of the Saltin-Grimby Physical Activity Level Scale (Schnohr et al., 2003). In this questionnaire, leisure time PA is assessed on a scale from I to IV following the categories: I = mostly sedentary (engaging in light PA < 2 hours per week), II = light PA for 2–4 h per week, III = light PA > 4 h per week or more vigorous activity for 2–4 h per week, and IV = highly vigorous PA > 4 h per week or regular heavy exercise or competitive sports several times a week (Schnohr et al., 2003). Data on comorbidities, diagnosis, oncological treatment, and Eastern Cooperative Oncology Groups (ECOG) performance status (PS) were collected from medical charts. Comorbidities were assessed according to the Charlson Comorbidity Index (CCI) (Charlson et al., 1987).

## 2.4. Ethics

The study was reported to the Scientific Ethics Review Committee of the Capital Region of Denmark (J.nr.:H17027105) and to the Danish Data Protection Agency (j.nr.:2012-58-0004), and was conducted in accordance with the Helsinki Declaration (World Medical Association, 2013). Consent for study participation was obtained before each interview.

As the informants for this study can be considered as a highly vulnerable group of patients (older patients with advanced cancer during oncological treatment), effort was made to ensure that participation in the study was as easy and convenient for the informants as possible. Therefore, interviews at the hospital were all conducted when the informants were already at the hospital for a scheduled appointment. By preference, the informants were also allowed to have a relative present during the interview to ensure that all informants felt as comfortable during the interviews as possible.

## 2.5. Data analysis

All qualitative data were managed with the QSR International's NVivo 12 software and analyzed using the 6-step thematic analysis described by Braun and Clark (Braun and Clarke, 2006); (I) reading the transcripts or listening to the recording several times, (II) generation of meaningful units, (III) searching for themes, (IV) reviewing themes and deciding which to combine, refine or separate, (V) defining and naming themes, and (VI) writing the report. The full analysis was conducted by MKM, and in triangulation with Mary Jarden (MJ) in steps III–V.

For the data describing the included informants, the median number and range were calculated for all quantitative variables (age and time since diagnosis), and for nominal variables (sex, cancer diagnosis, treatment, PS, CCI score, working status, marital status and level of leisure time PA) the number and percentage distribution were calculated.

## 3. Results

A total of 25 eligible patients were invited to participate in the study. Two patients declined; one due to lack of interest, and one because he felt too tired to participate due to severe anemia. Thus, 23 patients (referred to as informants) were interviewed. Most interviews were conducted face-to-face at the hospital (N = 18) or at the informant's home (N = 1), while other interviews were conducted by telephone (N = 4). Approximately half of the informants (N = 10) preferred having a relative present during the interview. Characteristics of the included informants are shown in Table 2. Informants were men (N = 12) and women (N = 11) aged 65–85 years (median 72 years) with advanced NSCLC (N = 11), pancreatic cancer (N = 7) and biliary tract cancer (N = 5). The median time since diagnosis was 7 months (range 1–18). Most informants received chemotherapy (N = 16), while 7 informants with NSCLC received immunotherapy. CCI ranged between 0 and 4, and most had a PS of 0–1 (N = 22). The most common comorbidities were hypertension, hypercholesterolemia, chronic

**Table 2**  
Characteristics of the informants.

	Total (n = 23)
Age, median (range)	72 (65–85)
Sex; men	12 (52%)
Cancer diagnosis	
Lung	11 (48%)
Pancreatic	7 (30%)
Biliary tract	5 (22%)
Time since diagnosis in months, median (range)	7 (1–18)
Treatment	
Chemotherapy	16 (70%)
Immunotherapy	7 (30%)
Performance status (ECOG)	
0	11 (48%)
1	11 (48%)
2	1 (4%)
Charlson comorbidity index (CCI)	
0	7 (30%)
1	8 (35%)
≥ 2	8 (35%)
Level of activity (current)	
I	6 (26%)
II	10 (44%)
III	6 (26%)
IV	1 (4%)
Marital status	
Married/living with partner	14 (61%)
Single/widow	9 (39%)
Working status	
Retired	20 (87%)
Working	2 (9%)
Sick leave	1 (4%)

Unless otherwise stated, data are shown as number (N) and percentage in parentheses (%). Level of activity is assessed with a modified version of the Saltin-Grimby Physical Activity Level Scale (I = mostly sedentary, II = Light PA, III = Moderate PA, IV = high PA). Abbreviations: CCI (Charlson Comorbidity Index), ECOG (Eastern Cooperative Oncology Group).

obstructive pulmonary disease (COPD), cardiovascular disease and diabetes. The informants' current activity level ranged widely between I–IV, with most of the informants (N = 10) performing light activities for < 4 h per week.

Six themes related to the three research areas emerged from the analysis: 1) A general positive perception of physical activity is expressed, 2) Comorbidities and external circumstances prevent physical activity, 3) Fatigue overshadows life, 4) Social support is key to short and long-term motivation, 5) Fixed conditions keep one focused, 6) Familiarity raises confidence and motivation. The six themes relating to each of the three research areas are shown in Table 3.

### 3.1. A general positive perception of physical activity is expressed

Regardless of their past and present level of physical activity (PA), the informants had a general perception of PA and exercise as being healthy and beneficial for them.

“Well, exercise is always good. It would definitely be good for me” (ID 2, 79-year-old female with biliary tract cancer)

The positive perception of PA was also reflected in their attitudes towards PA during oncological treatment. Some informants mainly emphasized the potential physical effects of exercise as being important during treatment, while other informants highlighted the psychosocial benefits from PA, such as having meaningful activities to look forward to, and to avoid social isolation. The positive perceptions of PA were reinforced by what they heard in the media and from the HCPs. This information from HCPs was valued by the informants, who also experienced being praised and supported by the HCPs when they managed to stay physically active.

**Table 3**  
Research areas and identified themes.

Research areas	Themes
Attitudes towards physical activity (PA) during oncological treatment Barriers towards PA	<ul style="list-style-type: none"> <li>• A general positive perception of physical activity is expressed</li> <li>• Comorbidities and external circumstances prevent physical activity</li> <li>• Fatigue overshadows life</li> </ul>
Motivators, facilitators and preferences for PA	<ul style="list-style-type: none"> <li>• Social support is key to short and long-term motivation</li> <li>• Fixed conditions keep one focused</li> <li>• Familiarity raises confidence and motivation</li> </ul>

“That is what they [HCPs] tell me. It is important to keep in shape ... to be resilient, you might say” (ID 9, 68-year-old male with NSCLC)

Only one informant with pancreatic cancer questioned exercise as an exclusively beneficial strategy. This informant had involuntarily lost 30 kg in the time up to the diagnosis and described how exercising made him feel anxious about losing more weight.

“Because I found out that if I burned 1, 2, 3, 4, 5, 600 calories every hour, then I would not be able to catch up (with that). Meaning, I would experience a bigger weight loss by exercising. I simply could not afford it. So, I stopped” (ID 13, 69-year-old male with pancreatic cancer)

Despite positive attitudes towards exercise, most informants expressed that it was very difficult to stay active in their new everyday life with cancer, and only few were still involved in structured exercise. The informants who had managed to stay physically active during treatment described how exercise provided new energy, gave a mental break from negative feelings of being seriously ill, and at times had the ability to reduce fatigue. More specifically, being physically active altered feelings of fatigue into more normal and well-known feelings of being physically tired.

“You might call it a more natural tiredness. You have a reason for feeling tired, right? Of course, there is also a reason for feeling tired from cancer treatment. But in that case, it is just inflicted upon you.” (ID 20, 72-year old male with biliary tract cancer)

Most of the informants who had remained physically active during treatment had also been active for a large part of their lives and therefore knew and appreciated the positive effects of exercise.

### 3.2. Comorbidities and external circumstances prevent physical activity

Several barriers towards physical activity (PA) were identified. Everyday life in their current situation was already filled with practical challenges, and there was no reserve of mental energy to start engaging in new activities. Even normal circumstances like bad weather could make PA unmanageable. Other changes in daily life were for some more than enough to comprehend, and therefore PA was not their main priority.

“I have more than enough to handle with carpenters working at my house, handling oncological treatment and everything else that is going on now. There is no energy for anything else other than just getting by” (ID 1, 85-year old female with NSCLC)

Passing events across the life span changed the informants' normal exercise routines. Some described that their exercise routines had been ruined because their usual exercise facility had closed, because their dog had died, or because their spouse or usual training partner was not able to participate anymore. Starting over and creating new exercising routines could be an insurmountable task.

“And then he [best friend] could not manage to exercise with me anymore, and that spoiled a lot for both of us” (ID 22, 76-year-old male with biliary tract cancer)

The informants experienced that physical limitations made it difficult to participate in team sports or to exercise at a gym. They were not sure how much and what kind of exercise they were capable of and felt unsure about their own physical boundaries. Some informants who had COPD or dyspnea felt unsafe about exercising - especially without supervision from a HCP, as acute dyspnea provoked feelings of distress and anxiety.

“I cannot just go to the gym down here and say that I have this much lung capacity left. They would not know where to set the level. Surely, I cannot exercise at the same level as healthy people” (ID 18, 77-year-old male with NSCLC)

Some informants described that the greatest physical limitations were not even related to their current cancer, but to comorbidities or musculoskeletal disorders (osteoarthritis or unspecified hip and back pain). Sometimes, the current life situation and treatment schedule prevented them from getting other medical conditions examined by their general practitioner, as they did not have the energy or because they could not overcome the consequences. Therefore, these physical limitations remained barriers that hindered PA.

“I had back surgery for spinal stenosis. It went ok for a while, but then the pain started in the pelvis and spread down to the legs. So, it is probably something with the nerves. But I cannot really deal with anything else than this [oncological treatment] right now” (ID 1, 85-year-old female with NSCLC)

### 3.3. Fatigue overshadows life

The informants described fatigue as being the most profound barrier. Fatigue interrupted their normal routines, and even daily house-keeping activities such as vacuuming suddenly became major tasks to overcome. Fatigue was described as an overwhelming feeling that just overshadowed everything else.

“Maybe I sleep more now. Sometimes I need a nap again after breakfast” (ID 6, 65-year-old female with NSCLC)

Fatigue was frequently described in combination with other symptoms. Some experienced fatigue and loss of appetite/anorexia, or fatigue and dyspnea as symptoms that mutually affected each other. The interaction between different symptoms was described by an informant with NSCLC who had severe fatigue in the period up to cancer diagnosis, but who experienced symptom relief after starting treatment with immunotherapy.

“Overall, you do not really feel like doing anything. Eventually it came back [energy]. I started feeling better and better, and I also got my appetite back. But before that I did not want to eat anything, do anything, or to meet up with anyone. You just do not feel like it”. (ID 5, 73-year-old male with NSCLC)

The informants often experienced fatigue in the days following treatment. In addition, some were affected by side effects from steroids and therefore experienced several ups and downs with fatigue during each treatment cycle. Some were able to organize their life to fit in with the treatment course, and they planned their activities on days when



they expected to be most energetic. For other informants, the feeling of fatigue was totally unpredictable, and they gave up trying to engage in any scheduled activities.

“But then I had a couple of days where I thought ‘Yes, now I can do a whole lot again’. So, I went cycling and WOO-HOO it went well. Until I got to the end of the week and then BOING, right?” (ID 7, 65-year old female with NSCLC)

### 3.4. Social support is key to short and long-term motivation

The informants identified several motivators and facilitators for PA, including social support from family and friends. The most effective way to activate the informants was if a relative accompanied them in exercising. This friendly nudging and participation from relatives was greatly appreciated by the informants.

“My friend tells me that we are going for a walk. When I am feeling really bad, she picks me up in her car, and then she takes me to a place by the sea to go for a walk” (ID 23, 75-year-old female with biliary tract cancer)

Exercising with peers provided social interaction, enjoyment, shared understanding and equal competition, and was therefore considered as highly motivating. The informants also expressed that exercise, in particular with others, gave them a break from thoughts and worries and facilitated feelings of normality. Some were already engaged in COPD or cardiac rehabilitation and preferred to continue these activities.

“Perhaps it could just as well be with anyone else. But when you exercise with people who have the same disease as yourself, then you will try to naturally compete with them. You cannot surpass people who are completely healthy. But here, one must try to be the best, right?” (ID 5, 73-year-old male with NSCLC)

### 3.5. Fixed conditions keep one focused

Structured and supervised exercise was preferred, as fixed agreements and shared responsibility made it easier to attend. In addition, exercising with others motivated the informants to perform better.

“It is because, I know that it is so extremely good for you. And because I can feel, that I have become a horrible couch potato. I know that I need solid support to help me build this up, and that it must be based on my current situation [having cancer]. It must be with a team – or along with someone who I would like to do it with. Otherwise I will not be able to do it at all” (ID 15, 65-year-old female with pancreatic cancer)

Some informants who were used to exercising on their own, preferred to keep doing so, because it was easier to fit it into their everyday routine and treatment schedule. However, most informants recognized or had eventually realized that they needed professional guidance and support.

“I am not so diligent to crawl around on the floor at my own house. You know, the physiotherapist often says: ‘you can lie down on the floor and do these exercises for your back’. It just does not happen. Because then I see the dust bunnies under the chair or something like that, right? And then I think to myself ‘you cannot just lie here and do nothing’” (ID 12, 69-year-old female with pancreatic cancer)

The informants highlighted that exercise programs should be organized in a way that made it as easy as possible to attend. This could be done by placing exercise facilities in the local communities or by providing patients with transportation. It was also suggested that exercise programs could be organized at the hospital, and that patients should be able to exercise in combination with their hospital

appointments. Some informants even argued that exercise programs should be presented to patients as an integrated part of the oncological treatment regimen.

“It cannot be something like ‘you should do this and that’. NO, you must present it as a part of the treatment plan. A necessary part of the treatment” (ID 17, 71-year-old male with pancreatic cancer)

Some informants already used pedometers or activity trackers to monitor daily activity. Goal-setting and tracking progress were identified as highly motivating strategies that could support long-term motivation.

“I remember it from the time after my heart attack. I kept setting small goals. And by setting small and achievable goals, I was able to succeed. Achievable goals are very important, because then you get successful experiences” (ID 20, 72-year-old male with biliary tract cancer)

### 3.6. Familiarity raises confidence and motivation

The informants suggested several types of exercise activities. Some informants would prefer exercise that targeted their current needs. For example, cardiovascular training was preferred by some informants who experienced shortness of breath. Other informants who had experienced loss of strength and who struggled with daily activities preferred resistance training. However, the overriding picture that appeared from the interviews was that the informants preferred activities that they had previously engaged in and were familiar with. Therefore, exercise preferences varied and included team-based activities with light to moderate intensity aerobic and strength training, walking, cycling, badminton and tennis. Talking about former activities and exercise memories brought enthusiasm and excitement to the informants.

“Another thing that I wished I could do is bicycling. I used to bicycle with my friend and my brother. We could bike 60 km in a day, right. We brought some food, drinks and coffee. And then we rode to the woods, and walked in the hills” (ID 21, 82-year-old male with biliary tract cancer)

## 4. Discussion

This study explored attitudes towards and experiences with PA and exercise in older patients with advanced cancer during oncological treatment. We found that PA was viewed as a positive self-management strategy during oncological treatment. However, the informants described that their level of PA had declined after cancer diagnosis, and that staying active was a struggle. Challenges in maintaining PA during cancer treatment have also been documented in prior studies (Dahele et al., 2007; Devoogdt et al., 2010; Granger et al., 2016; Lynch et al., 2007; Midtgaard et al., 2009). In a prospective cohort study, Fassier et al. (2016) investigated levels of PA before and after a cancer diagnosis among 942 adults. It was found that the PA level decreased after diagnosis, especially among older subjects ( $\geq 60$  years) (Fassier et al., 2016). Despite demonstrated decline in PA during anti-cancer treatment, prior research has also shown that most patients with cancer have a positive perception of exercise, and that many have a desire to increase their level of PA (Clark et al., 2007; Midtgaard et al., 2009).

Only one informant in the current study expressed fear that exercise could be potentially harmful, and this was specifically focused on the risk of weight loss. These results are in contrast with findings from a qualitative study by Lees et al. (2005), where barriers towards exercise behavior were investigated in 66 older adults ( $\geq 65$  years) through focus-group interviews with exercisers and with non-exercisers, respectively. Fear of falling and/or getting injured was the most significant barrier among non-exercisers, whereas this fear was not expressed among the informants who exercised regularly (Lees et al.,

2005). Hence, current exercise habits could explain the differences in study results. However, the informants in our study were a relatively even sample of experienced and non-experienced exercisers. But in contrast to the study by Lees et al. (2005), the informants in our study were seriously ill with advanced cancer, and it may be that having advanced cancer and going through oncological treatment simply overshadows other age-related fears of exercise behavior. However, as problems related to balance, bones and joints, and risk of falling are highly associated with older age (Klepin, 2015; Wildes et al., 2015), HCPs must take patients' concerns about falling seriously, and exercises for balance and strength should be incorporated in exercise programs to reduce the risk of falling.

Several barriers to PA and exercise were expressed in our study. Primarily, fatigue was described as a major barrier. This finding is not surprising, as cancer-related fatigue (CRF) is the most frequently occurring symptom during anti-cancer treatment with prevalence rates ranging from around 25%–100% depending on cancer stage, diagnosis, treatment and assessment method (Berger et al., 2015; Weis, 2011). As evidence suggests that exercise can reduce CRF in patients with cancer (Puetz and Herring, 2012), HCPs should inform patients about these potential effects, which may increase patients' motivation for exercising. In addition, future exercise programs could incorporate education or counseling on fatigue management to increase adherence to exercise programs.

As seen in other studies investigating exercise barriers among different study populations, bad weather seems to be a universal barrier to outdoor PA (Baert et al., 2015; Cheville et al., 2012; Sheill et al., 2018). In our study, physical limitations caused by aging or comorbidities, and a wide range of external circumstances were also barriers to exercise. The findings of physical limitations and comorbidities as barriers to PA are in accordance with the results from a systematic review conducted by Bauman et al. (2012). Factors such as health status, self-efficacy and previous PA were identified as consistent correlates with PA. Similarly, other studies investigating factors associated with regular exercise specifically in older adults found that perceived physical frailty and poor health are negatively associated with PA (Rhodes et al., 1999). When engaging older patients with cancer in exercise programs, it is important that HCPs take the individual patient's health status into consideration. Thus, exercise programs must be composed in a way that allows individual adaptations to ensure feasibility, comfort and safety.

In the current study, life events that occurred in older age were reported as barriers to PA, as these events often affected daily life routines. This is in accordance with prior research that has shown that major life events may accelerate feelings of getting older, and thus change self-efficacy towards PA (Kenter et al., 2015). Moreover, our results confirm that prior exercise habits and peoples' sociocultural understandings of PA throughout life affects later motivation and self-efficacy for PA (Kenter et al., 2015). Mapping previous experiences with PA and previous life events can assist HCPs to identify individual support needs prior to and during exercise engagement.

Social support from family and friends was identified as a motivator for PA. In addition, social interactions were highly valued and motivating in relation to structured exercise, and therefore group-based exercise was preferred. Many preferred to exercise with people who were at the same physical level as themselves, or with those who they had something in common with. These findings are consistent with the results from a qualitative synthesis performed by Franco et al. (2015) that explored older people's perspectives on PA participation. In this synthesis, informants in 65% of the included studies valued social contact during exercise and/or preferred group-based activities. In contrast to our results, Franco et al. (2015) also found that informants in 22% of the studies reported a lack of confidence or feelings of awkwardness in social exercise settings. This was particularly found in relation to PA that involved people from different age groups, physical capabilities or cultural backgrounds (Franco et al., 2015). In our study, the informants expressed that exercise programs should be tailored to

individual needs and limitations. Hence, it is possible that feelings of inability or awkwardness could be reduced if individual adjustments were made.

In line with prior studies focusing on preferences for exercise among older people (Jancey et al., 2009; Janssen and Stube, 2014), the informants in our study preferred to engage in activities that were familiar to them. This may be due to memories and values that have been attached to the activities through life, and thus make the activities meaningful. Known activities may also provide confidence and increase self-efficacy. Even if age and cancer-related declines in health may inhibit older patients to engage in some former activities, patients' preferences and elements of their former activities could still be integrated in programs to increase short and long-term motivation.

#### 4.1. Strengths and limitations

The sample size of the study was determined by 'information power' as described by Malterud et al. (2016), and was influenced by a focused study aim, the specificity of the informants and type of analysis (Malterud et al., 2016). MKM who had experience in conducting research interviews and had clinical nursing experience in treatment and care for patients with cancer, conducted all interviews. The 23 included informants who were selected with a purposeful sampling strategy that ensured equal representation of females and males, different cancer diagnoses, treatments, and a variety of ages, provided rich and nuanced descriptions to cover the study aim.

In conducting a study that focuses on a relatively specific research area such as PA, there is a risk of selection bias (Norris, 1997), as patients who have an interest in this topic (i.e. active and/or experienced exercisers) naturally would be more willing to participate. In case of selection bias, there is a possibility that the informants' statements would not reflect the perceptions of patients whom we encounter in clinical practice. In this study, the risk of selection bias is estimated to be low as only two patients declined participation. In addition, data on current PA levels showed that we included both active and inactive informants.

It is possible that different interview methods and settings could have influenced the interviews. Face-to-face interviews differs from telephone interviews by providing another communication dimension using body language which potentially could influence the interviews as well as interpretation of data.

If a relative was present during the interview, he/she was told that the study aimed to capture the patients' perspectives, and thus were asked to remain neutral during the interviews. However, it cannot be ruled out that the presence of a relative affected the interviews by either limiting the informants' statements, or by strengthening communication through an increased feeling of security.

The informants in this study were all ethnic Danes or Scandinavians, and we did not capture the experiences of older patients from ethnic minority groups. Older patients with other cultural backgrounds might have other perceptions of PA and exercise due to other traditions. Thus, the uniform ethnic background of the informants weakens the external validity of the study.

#### 4.2. Implications for practice

The information provided from these interviews can be useful in the development of exercise programs for older patients with cancer. Based on the results it will be beneficial to make team-based and supervised exercise programs available for older patients with cancer either in their local communities, or in the hospital setting. Such programs should be supervised by instructors with experience within exercise for patients with cancer. To increase motivation exercise programs could incorporate elements of goal-setting and competition, and information about the beneficial effects of exercise should be provided. Motivation could also be strengthened by gathering patients with similarly

conditions or physical levels on the same teams. To improve adherence, attention must be paid to the patient's handling of symptoms and side effects, and advice about symptom management should be provided if needed.

## 5. Conclusion

In this study, the perceptions of PA and exercise were investigated among older patients with advanced cancer who were treated with palliative oncological therapies. Despite decreasing PA levels after the cancer diagnosis, we found positive perceptions of exercise among the informants. Factors related to both cancer and normal aging were identified as barriers towards PA - most profoundly was the overwhelming feeling of fatigue. Improving well-being and QoL, fixed conditions, social support and familiar activities were identified as motivators and facilitators for PA. HCPs working to promote exercise behaviors in older patients with advanced cancer need to take these identified factors into consideration to make exercise programs feasible for this cancer population.

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## Declaration of conflict of interest

The authors declare no conflicts of interest.

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